Fig.1a.

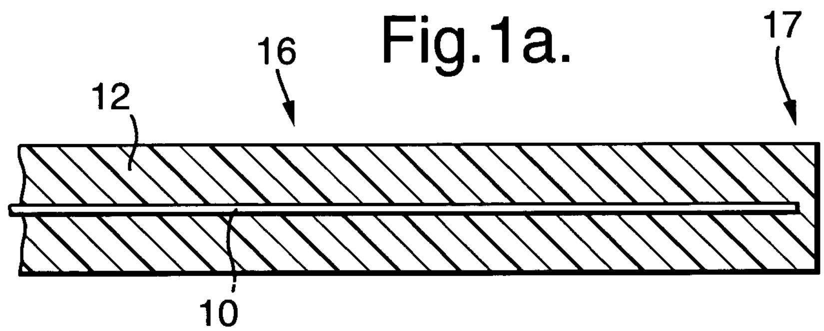

Fig.1b.

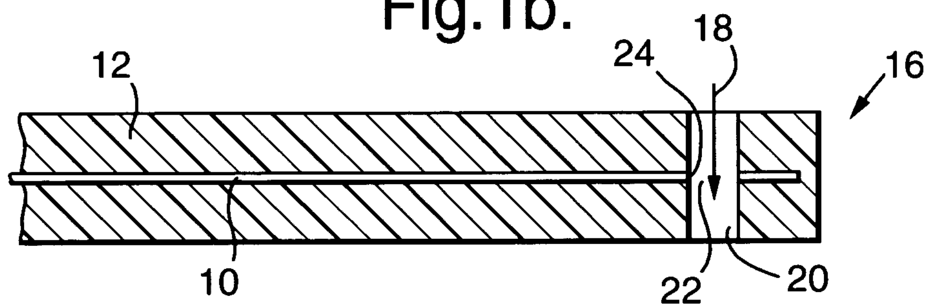

Fig.1c.

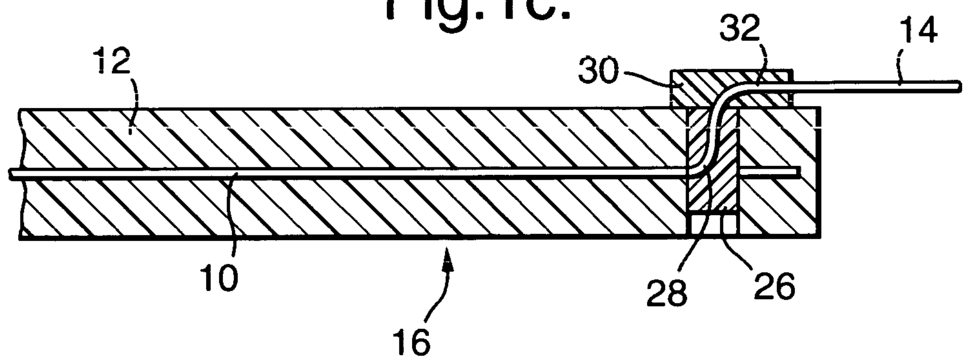

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Fig.2a.

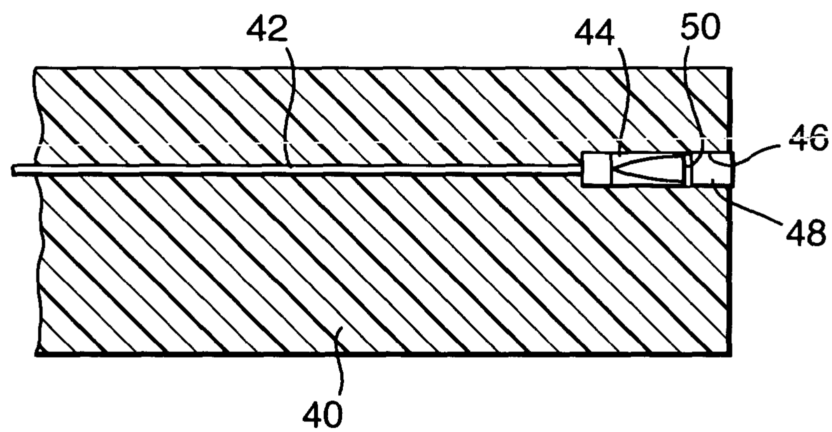

Fig.2b.

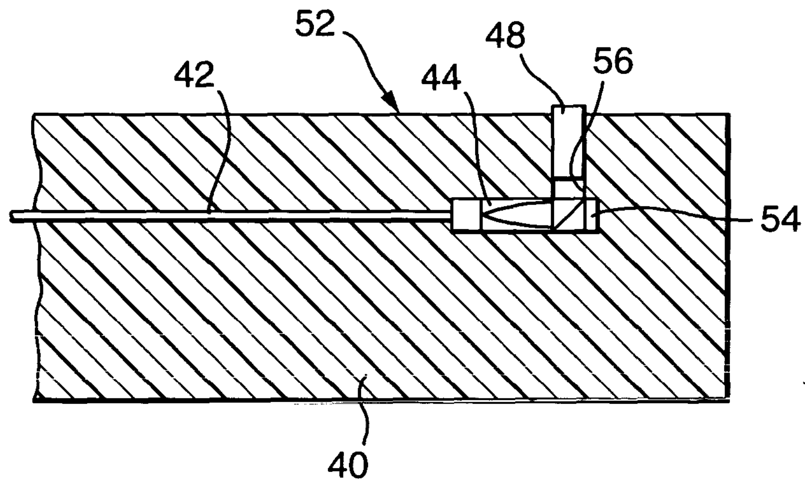

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Fig.3a.

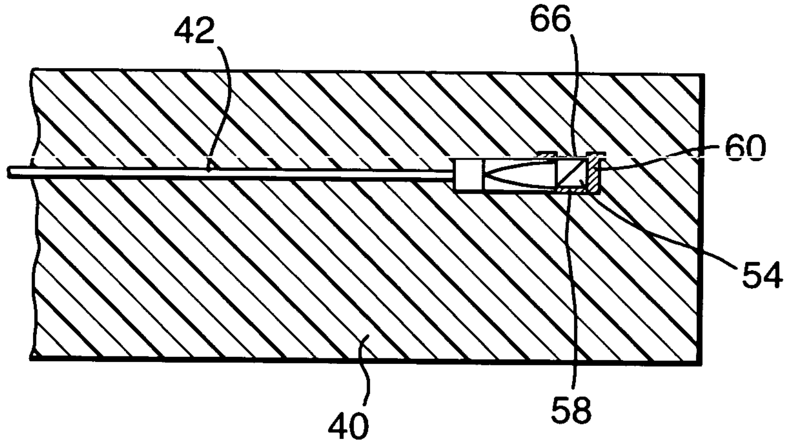

Fig.3b.

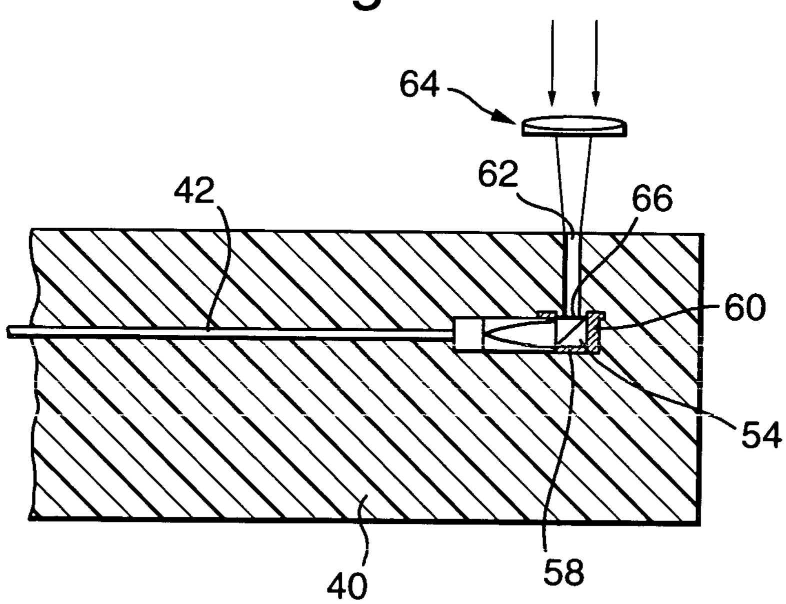

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Fig.4a.

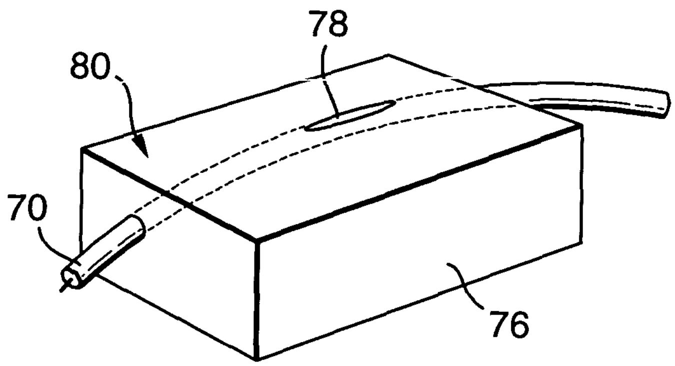

Fig.4b.

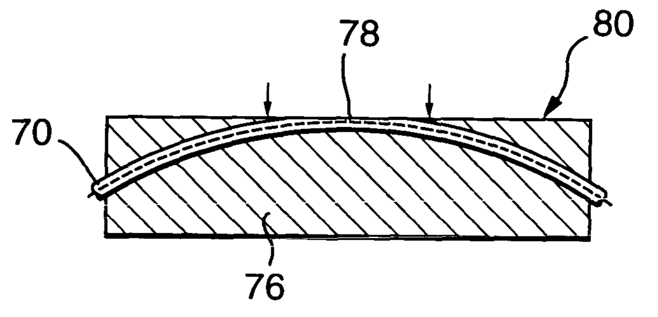

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Fig.5a.

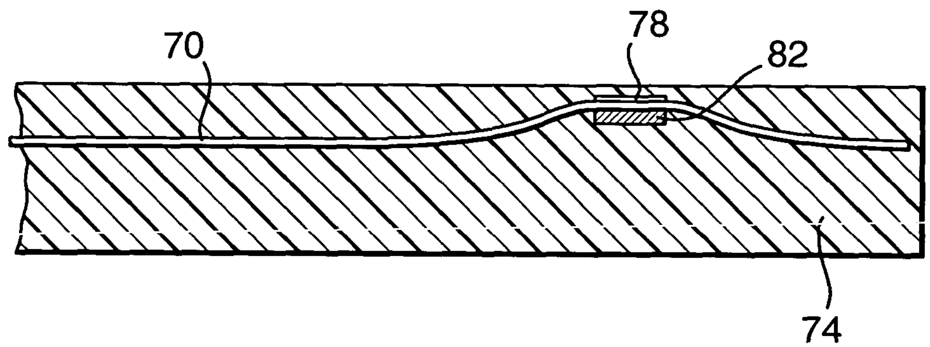

Fig.5b.

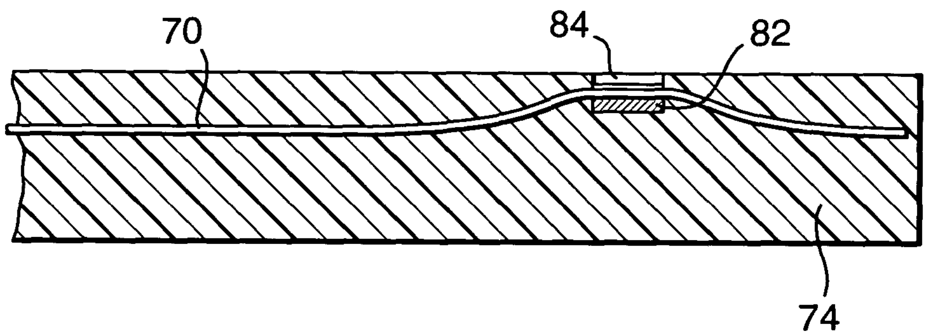

Fig.5c.

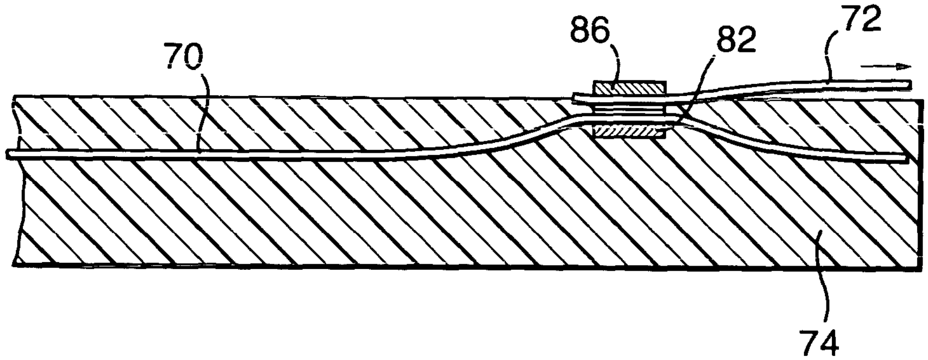

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Fig.6a.

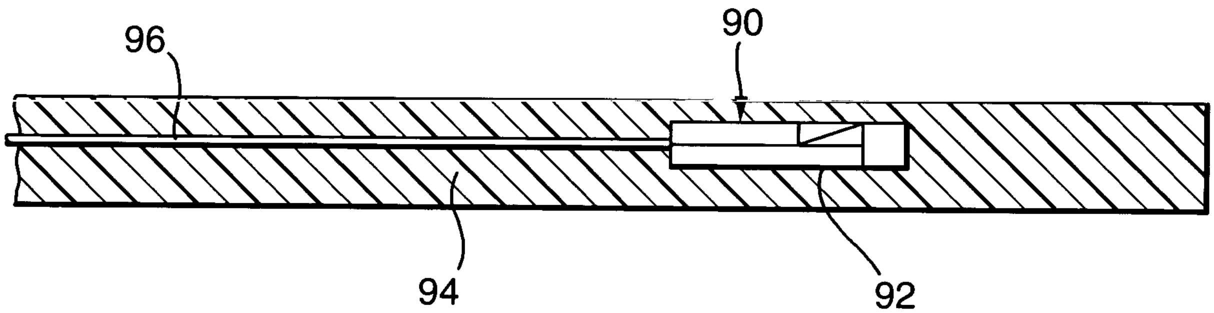
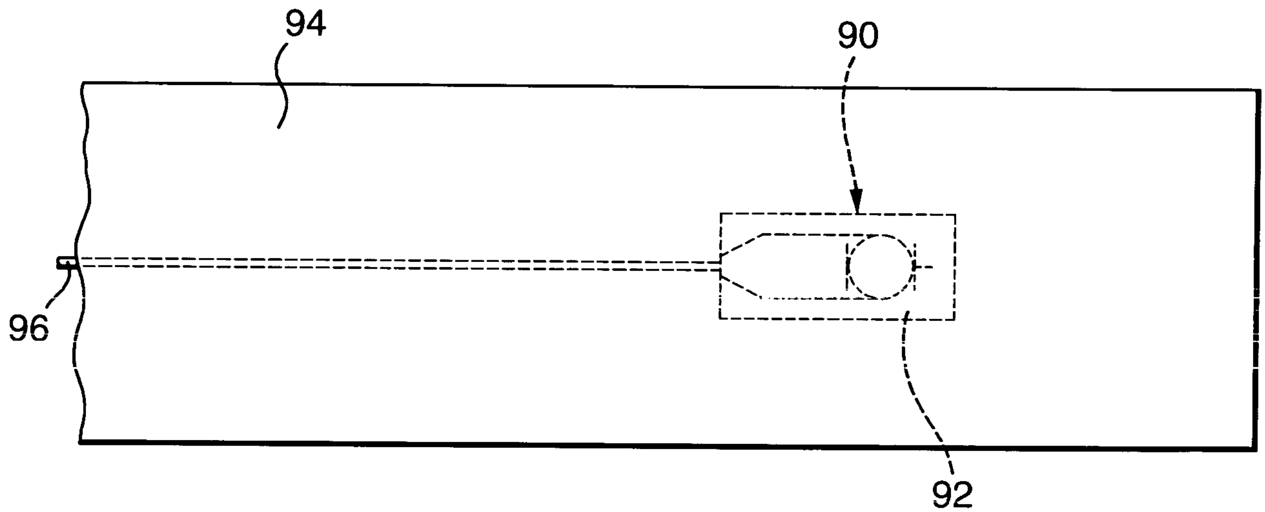


Fig.6b.



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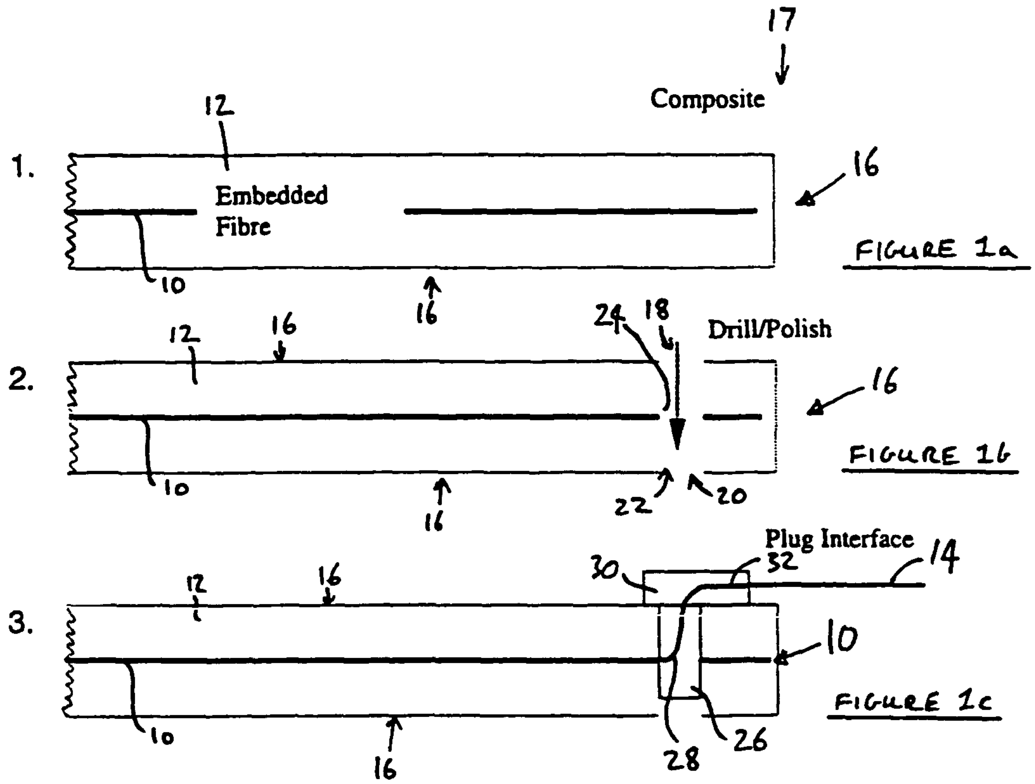


Figure 1. Concept of drilling through composite to find the embedded fibre. The fibre could be polished to reinstate an optical finish. External connections could then be made with a connector plug. Alignment could be controlled within the plug.

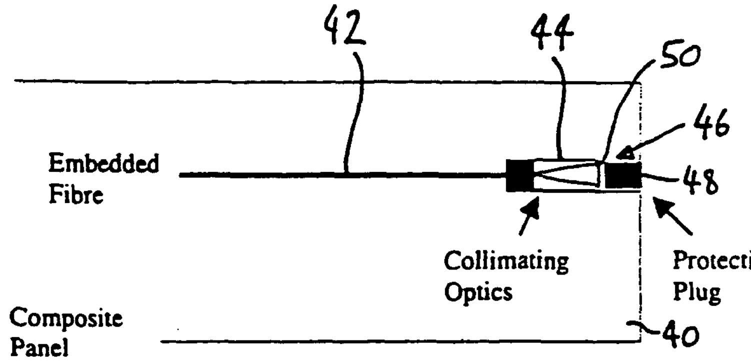


FIGURE 2a

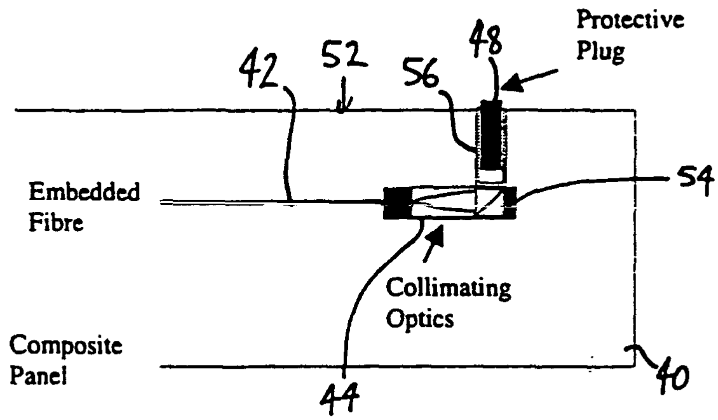
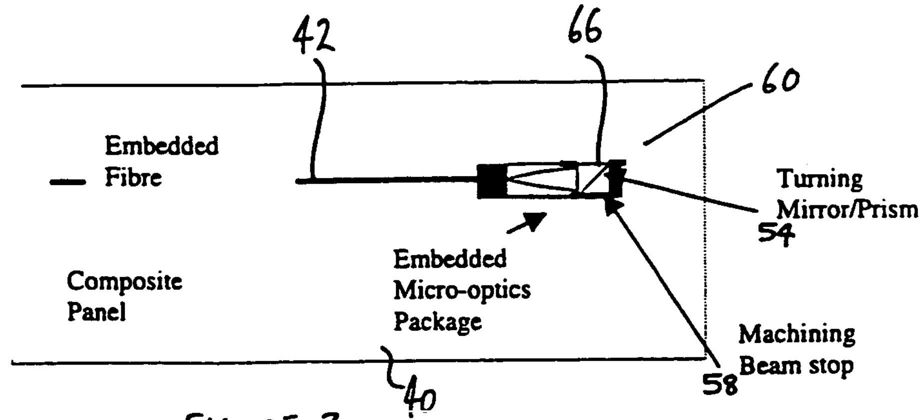


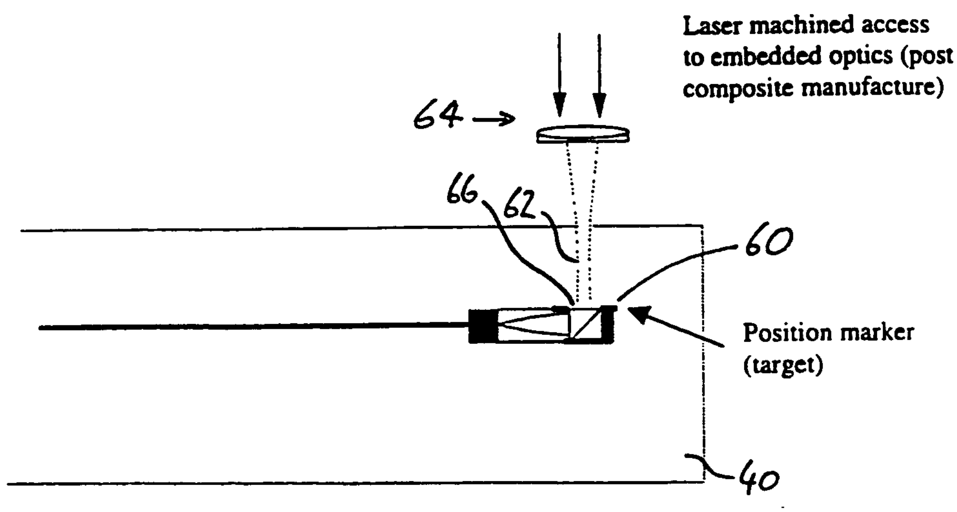
FIGURE 2b

Figure 2. Schematic concepts for edge and surface embedded optical ports to embedded fibres. Protective plugs could protect the ports during composite manufacture.



(a)

FIGURE 3a



(b)

FIGURE 3b

Figure 3. Potential concept to embed micro-optics within a composite panel (a). The optics could be accessed for interfacing after composite manufacture, possibly by precision laser machining (b). Connectors or fibres could be interfaced to the exposed micro-optical surface. Interfacing at the composite surface or edge (depending on the embedded optics package) may be possible.

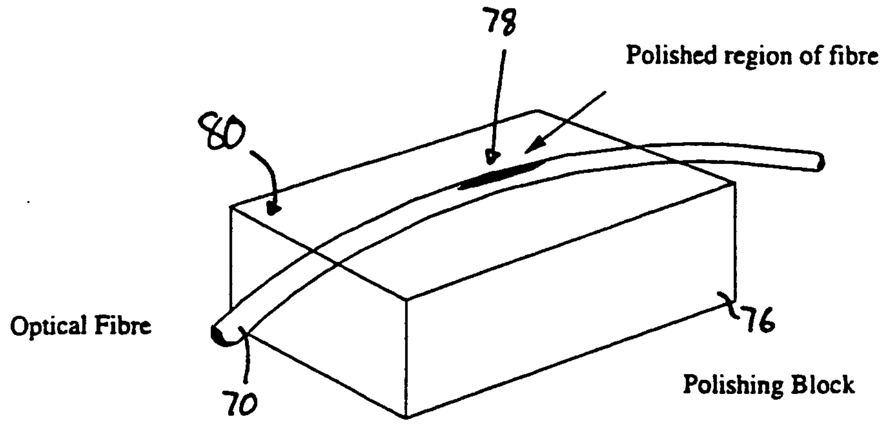


FIGURE 4a

Side view

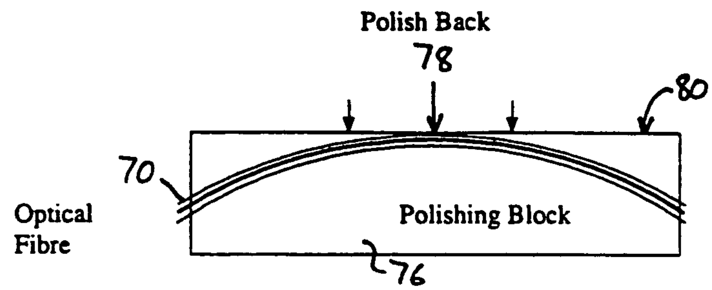


FIGURE 4b

Figure 4. Polishing of an optical fibre to form an evanescent coupler. Evanescent coupling could allow side coupling into embedded fibres, post-manufacture, by exposing an embedded coupler near the composite surface.

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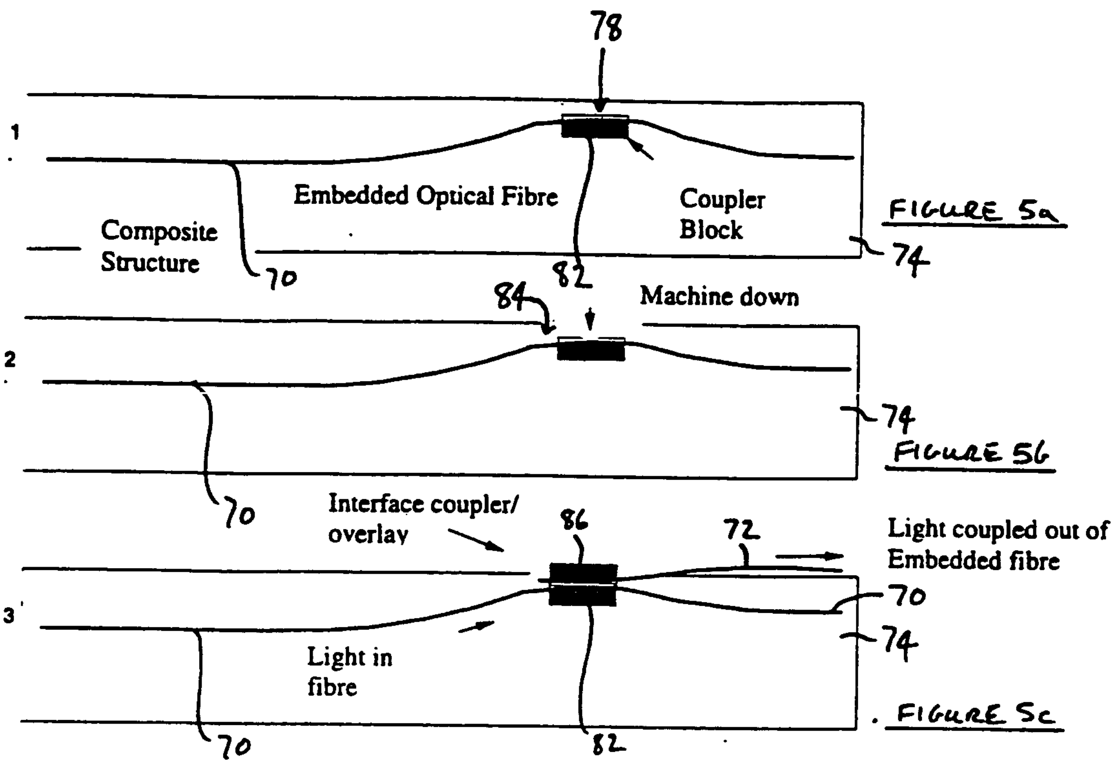

Figure 5. Schematic of evanescent interface formed by machining down to an embedded evanescent coupler structure (post manufacture).

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(a) Side view

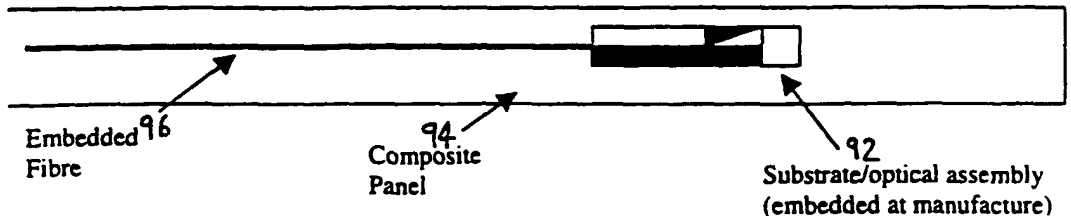

FIGURE 6a

(b) Top view (note structure is buried)

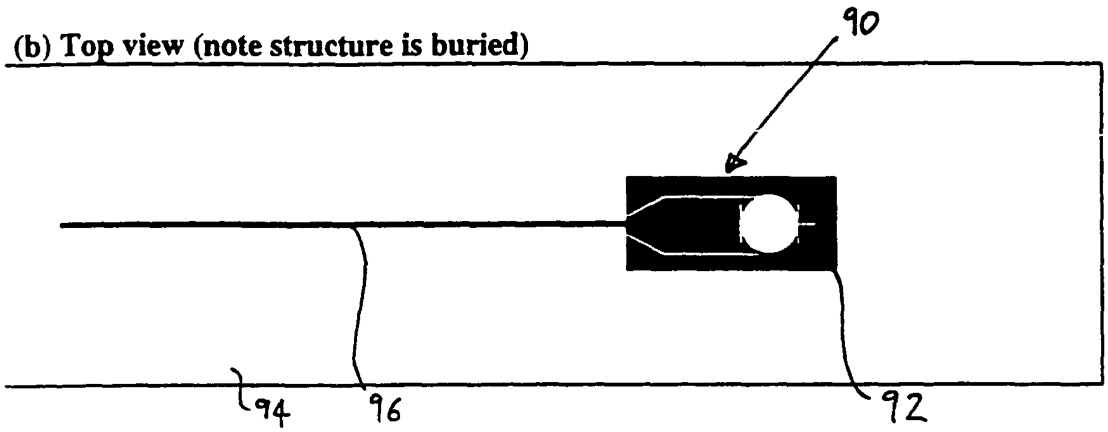

FIGURE 6b

Figure 6 Embedded fibre and substrate assembly. Such an assembly could comprise a number of optical processing elements.